



Governor's Water Augmentation, Innovation, and Conservation Council

Long-Term Water Augmentation Committee

Chair: Wade Noble

March 12, 2021 | 10:00am – noon

Webinar Logistics

- Please state your name when speaking.
- Mute yourself when not speaking.
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- The meeting and chat will be recorded.

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Welcome & Review



Agenda

1. Welcome – Wade Noble
2. Water Importation – Chuck Cullom, CAP
3. Storage Sites Subcommittee Update – Doug Dunham, Subcommittee Chair
4. Next Steps
5. Adjournment



Water Importation

Chuck Cullom, CAP

Update on Binational Desalination Study and Summary of Transbasin Concepts

Chuck Cullom
Colorado River Programs Manager

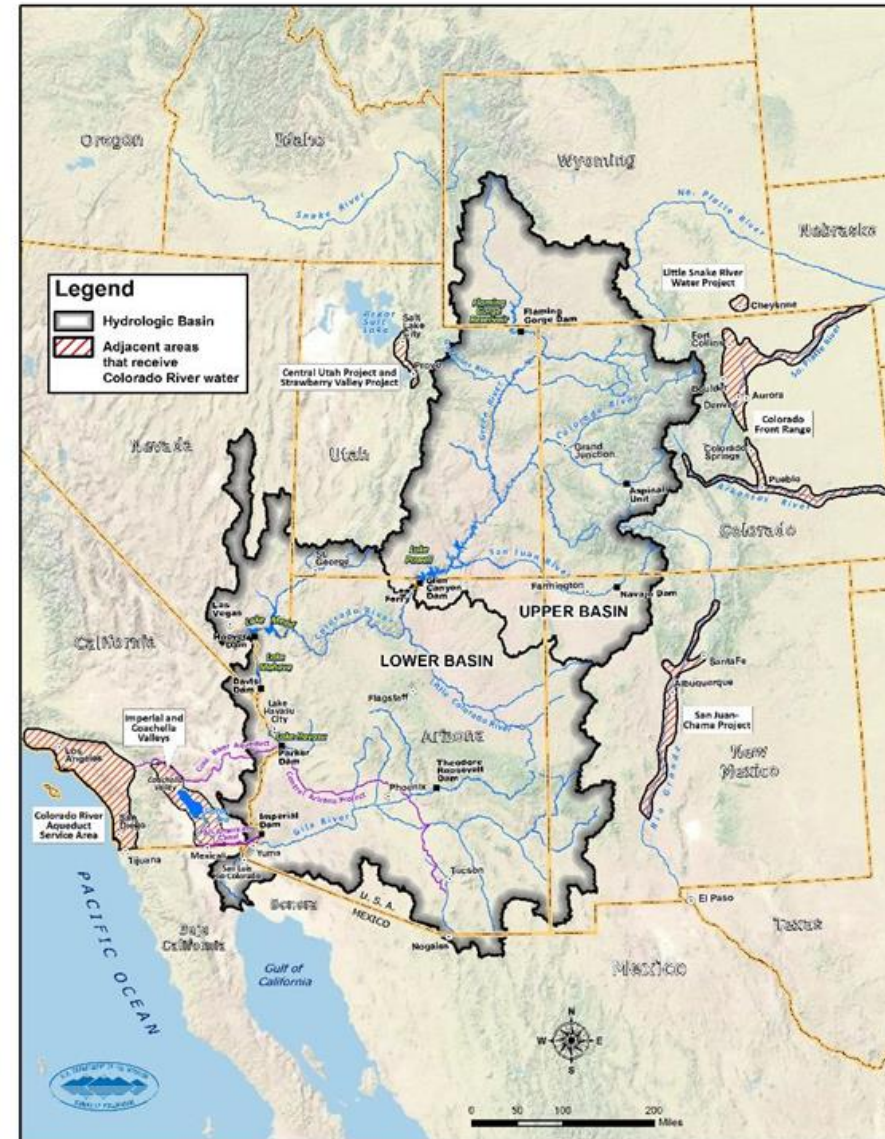
March 12, 2021



YOUR WATER. YOUR FUTURE.

Colorado River Basin Augmentation

- Arizona and CAWCD have actively explored Colorado River augmentation concepts since 2008 through the Basin States and binational processes
- The information provided here are derived from investigations carried out through the Basin States and binational processes
- CAWCD has not endorsed development of the concepts outlined in this presentation



A brief history of Colorado River Basin Augmentation

- The River is modest relative to other river systems (~14.8 MAF natural flow)
- Reliability derived from storage in Mead and Powell
- Supports +40 million people
- Supports ~5 million acres of irrigation
- Vital hydro-power resources
- Significant environmental resources



A brief history of Colorado River Basin Augmentation

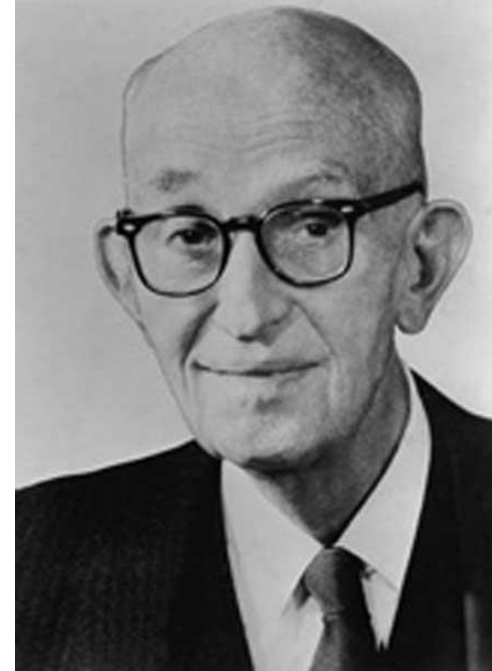
- 1944 recognition of “permanent Colorado River deficit” (California testimony in Senate 1944 Water Treaty hearings) and the need for augmentation
- 1964 – ’68 Basin States support Colorado River augmentation as means to address risk of future shortages in the Basin and inclusion of augmentation in CRBPA
- **1968 Study of Nuclear Power and Desalination in the SW US to address future risk of shortages**



**Representative Carl
Hayden**

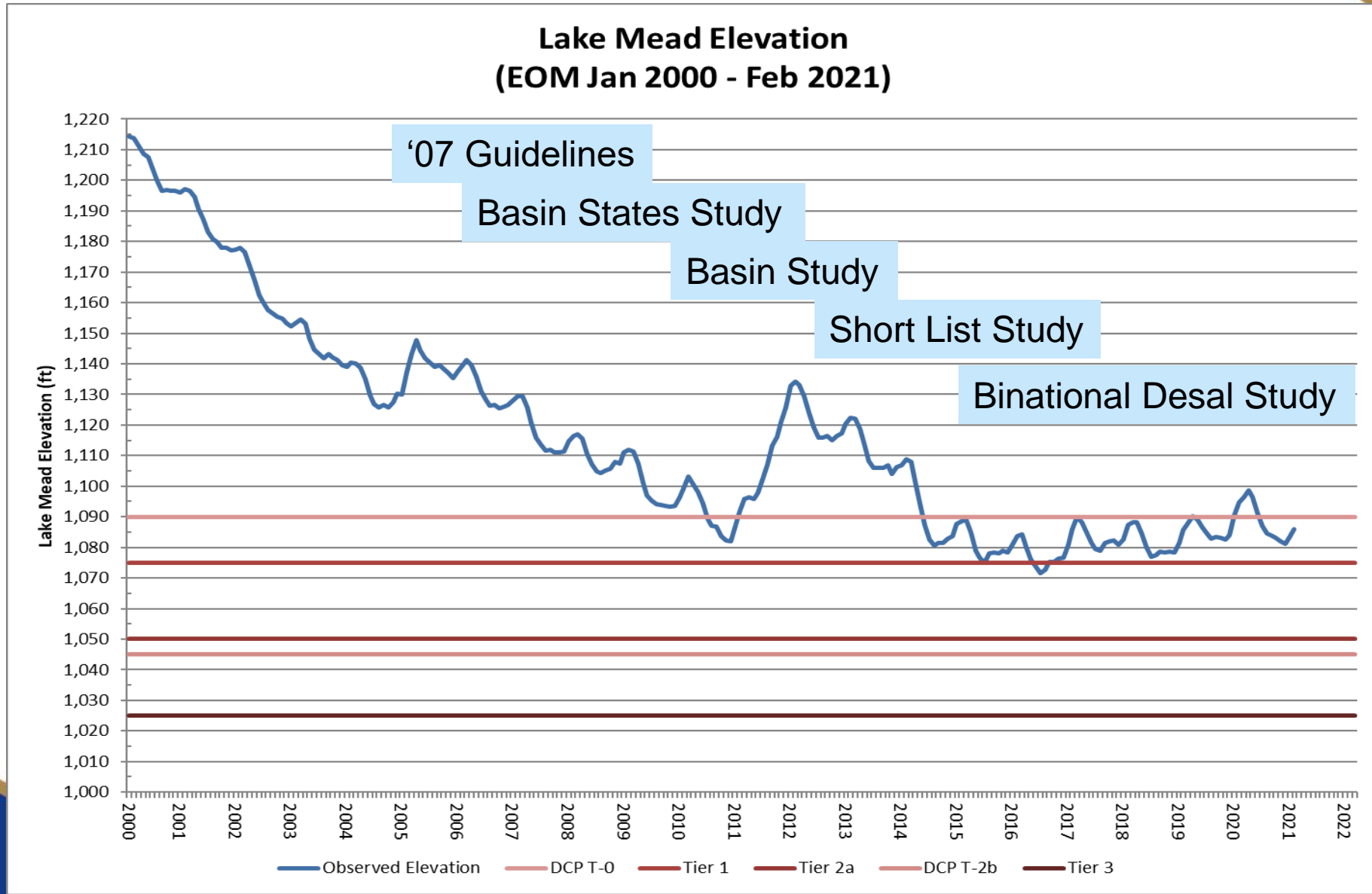
A brief history of Colorado River Basin Augmentation

- 1975 “Westwide Study” by BOR identifies general augmentation concepts to address future of shortages
- 1993 BOR’s CREST pilot and study of snowpack augmentation
- 2007 to P Interstate funding of snowpack augmentation in WY, CO, Ut
- **2008 Basin States Augmentation Study**
- **2012 BOR Basin Study includes augmentation options**
- **2014 “Shortlist Study” submitted to Basin States to refine augmentation options**
- **2017 Minute 323 includes binational (US-Mex) augmentation concepts**
- **2020 Binational Study of Sea Water Desalination Opportunities in Sea of Cortez completed**



**Senator Carl
Hayden**

Lake Mead Elevations

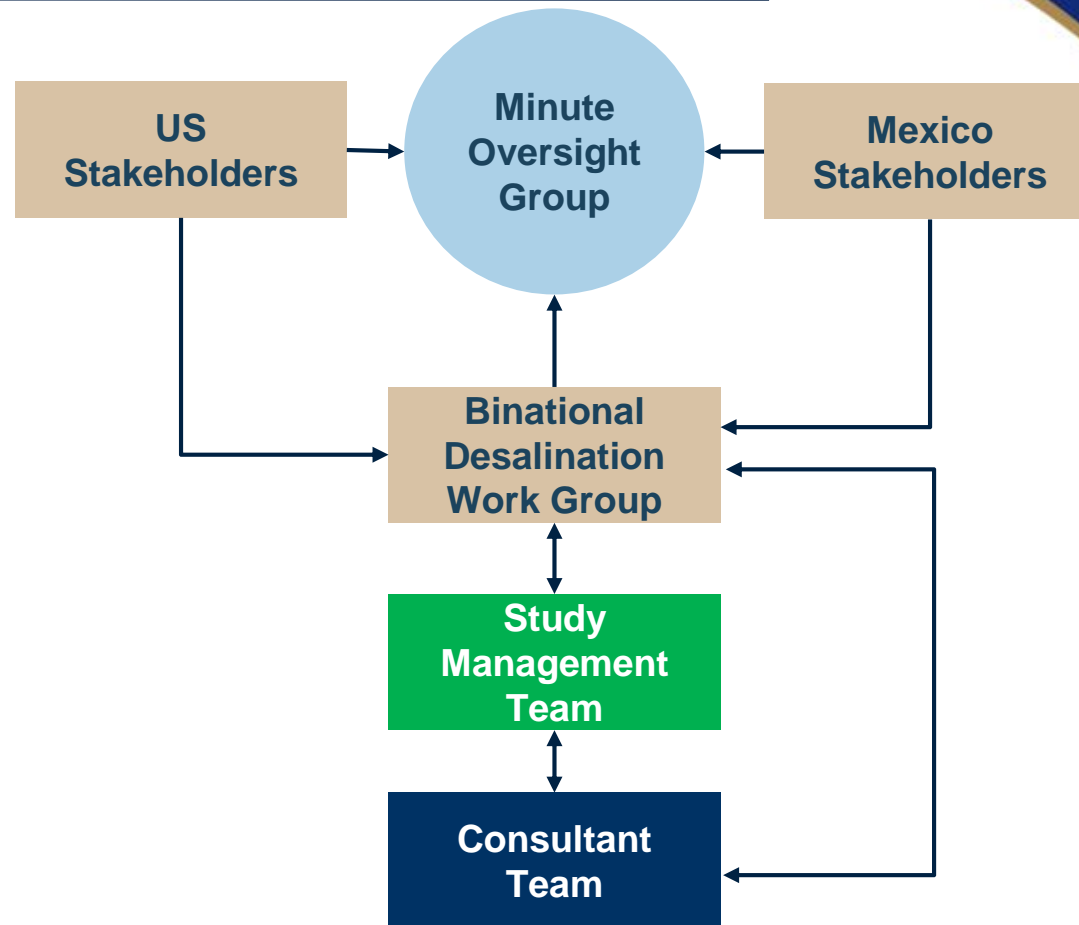


Binational Desalination Study: Sea of Cortez

- Authorized under Minute 323: **“Extension of Cooperative Measures and Adoption of a Binational Water Scarcity Contingency Plan in the Colorado River Basin”** on Sept 21, 2017
- Expressed a clear need for continued and additional actions due to the impacts on Colorado River storage
- **Noted the existence of opportunities for joint cooperative projects with the potential for direct delivery or exchange of Colorado River water benefitting both nations, including a binational desalination plant at the Sea of Cortez**
- Results will be compared to the investigations of other new water sources projects identified in Minute 323 once they are completed

Binational Desalination Study: Process

- Binational Work Group authorized under Minute 323
- Funded jointly by ADWR, CAWCD, SRP, FMI, California, Nevada
- Mexico and U.S. participants at Federal, State, Water user and NGO level



Potential Desalination Opportunities



Project Cost Estimate

COST COMPONENT	UNIT	OPPORTUNITIES 2 + 5 OPORTUNIDADES 2 + 5	OPPORTUNITIES 2 + 1 OPORTUNIDADES 2 + 1	OPPORTUNITIES 5 + 1 OPORTUNIDADES 5 + 1
Total capital cost	USD	\$4,744,605,036	\$4,906,179,692	\$4,509,251,032
Costo de capital total	MXN	\$91,172,330,371	\$94,277,148,961	\$86,649,767,830
Annual amortized capital cost	USD	\$308,643,366	\$319,154,030	\$293,333,251
Costo anual de capital amortizado	MXN	\$5,930,890,921	\$6,132,863,840	\$5,636,691,751
Annual operational cost (2019)	USD	\$155,369,000	\$148,391,000	\$196,558,000
Costo operativo anual (2019)	MXN	\$2,985,570,704	\$2,851,481,456	\$3,777,058,528
Net present value (2019)	USD	\$12,300,351,749	\$12,297,126,544	\$13,368,271,764
Valor presente neto (2019)	MXN	\$236,363,559,209	\$236,301,583,670	\$256,884,710,217
Net present value unit cost	\$USD/AF	\$2,050	\$2,050	\$2,228
Costo unitario del valor presente neto	\$MXN/m ³	\$31.94	\$31.94	\$34.71

Assumes a nominal interest rate of 5%, an inflation rate of 3%, a real interest rate of 1.9%, and 30 years for both the amortization and life cycle periods.

An exchange rate of 19.216 Mexican Pesos (MXN) to 1 US Dollar (USD) was used in the estimate.

Binational Study Conclusions:

- Opportunities were identified that have the potential to yield 200,000 af/yr
- Projected NPV costs are ~\$2,000 to \$2,200/af
- Desalination opportunities are technically, financially feasible and can be developed in an environmentally responsible manner
- Project development will be through continued binational collaboration and require an additional Minute

Executive Summary

<https://www.cap-az.com/documents/departments/planning/colorado-river-programs/Binational-Desal-Study-Executive-Summary.pdf>

Technical Memoranda

https://www.ibwc.gov/Files/TMs_All_Portfolio.pdf

Transbasin Diversion

Augmentation Concept:

- Studies to deliver Missouri or Mississippi River water to offset existing Colorado transbasin diversions to the Front Range have been explored in:
 - 2008 Basin States Augmentation Study
 - 2012 BOR Basin Study
 - 2014 Short List Study
- Assumes Transbasin diversion water remains in the Colorado River system
- Concepts set aside from further analysis

Summary of Short List Study

Concept and Analysis:

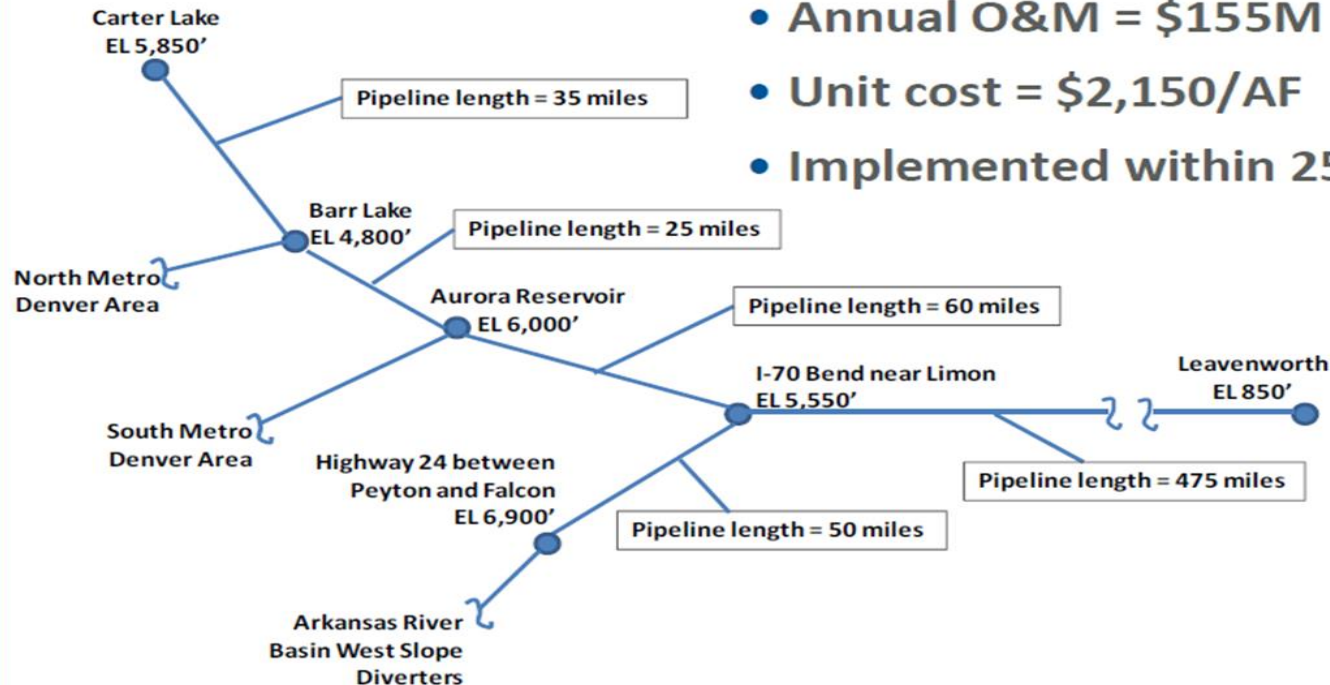
- Current Transbasin diversion average ~ 500,000 af/yr
- Offset transbasin diversions with diversion and conveyance from Leavenworth KS to Front Range, CO
- Concept evaluation of 200,000 af/yr
- **Significant** regulatory and permitting obstacles
- 2014 cost estimate ~\$6 Billion

Summary of Short List Study Concept and Analysis:

June 26, 2014

PROJECT 10 – MISSOURI RIVER CONVEYANCE TO COLORADO FRONT RANGE

- Yield = 200,000 AFY increments
- Capital cost = \$5.6B
- Annual O&M = \$155M
- Unit cost = \$2,150/AF
- Implemented within 25 to 30 years





Storage Sites Subcommittee Update

Doug Dunham, Subcommittee Chair

Subcommittee Purpose

Formed to identify criteria for selection of potential underground storage sites for possible revision of the 2017 report *Potential Water Storage Sites on ASLD State Trust Land*

2016 SB 1399 Report

Legislation directed ADWR and ASLD to develop a report that identifies potential water storage sites on State Trust Land by December 31, 2017.

ADWR Search Criteria

- Located along stream/watercourse
- ASLD ownership
- Overlies basin-fill or local alluvial stream deposits
- Not along a canal, near the Colorado River, or in an area with many existing USF sites

2016 SB 1399 Report

ASLD Additional Criteria

- Locations within general stream adjudication watersheds were eliminated
- Potential locations limited to areas in which water management overlays will protect water stored in USFs or will directly benefit State Trust land
- Hydrologic properties of basin fill/alluvium at potential sites
- Depth to water
- Locations of existing recharge facilities

2 ASLD Potentially Acceptable Storage Sites

- Cunningham Wash – La Paz County, Butler Valley Groundwater Basin
- Whitewater Draw – Cochise County, San Bernardino Groundwater Basin

Next Step Common Criteria Evaluation

Selected Areas/Sites for Evaluation

- Prescott AMA – Little Chino – Martin Canyon
- Pinal AMA – Eloy area – Greene Wash
- Willcox Basin – Bee and Wood Canyon Washes
- Santa Cruz AMA – Diablo Wash
- Sierra Vista Basin – Clifford Wash and unnamed wash

→ Evaluate the selected sites for common criteria

Summary of Potential Storage Sites

Common Criteria	Site #1 – Prescott AMA/ Martin Canyon	Site #2 – Pinal AMA/ Greene Wash	Site #3 – Willcox/ Bee & Wood Canyon	Site #4 – Santa Cruz AMA/Diablo Wash	Site #5a – Sierra Vista/ Clifford Wash	Site #5b – Sierra Vista/ Unnamed Wash
Proximity to population center	Adjacent to Chino Valley incorp. limits	1 mi. from Eloy incorp. limits	7 mi. from City of Willcox	4 mi. from Tubac	7 mi. from Tombstone	In Sierra Vista city limits
Annual average precipitation	19"	10"	13"	13"	12"	14"
Depth to bedrock	<400 ft to <800 ft	>800 ft	400 ft to 4,800 ft	<400 ft to 1,600 ft	800 ft to 1,600 ft	800 ft to 1,600 ft
Land surface elevation	~5,100 ft	~1,500 ft	~4,400 ft	~3,400 ft	~4,000 ft	~4,600 ft
Development status	Undeveloped	Undeveloped	Undeveloped	Undeveloped	Undeveloped	Undeveloped
General vegetation type	Plains grassland	Mixed palo verde/cactus/saltbush	Desert scrub grassland	Sonoran desert scrub and desert grassland	Chihuahuan desert scrub	Desert scrub grassland

Conclusions

- Difficult to realistically evaluate where it would be “best” to site projects on a statewide basis
- Didn’t want to limit potential opportunities
- Local stakeholders are best prepared to evaluate potential sites/opportunities
 - What would they need to consider to make an assessment?
 - What resources are available to assist?

Project Presentations

Horseshoe Draw Project, Cochise County – John Ladd

Hualapai Valley Basin and Kingman Subbasin Projects – Nick Hont



Horseshoe Draw Project
photo: <https://ccrsanpedro.org/>



Drywells in subdivision detention basins
photo: Mohave County Development Services



Kingman Monsoon Park Infiltration Basin
photo: Mohave County Development Services



Overview of Proposed Approach

A guide to underground water storage facility site selection

- Statewide evaluation criteria
- Initial investigations for interested parties to consider
 - Land use status
 - Technical feasibility
 - Regulatory & permitting considerations
 - Facility conceptual development
 - Facility design





Questions/Discussion

Next Steps



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ADWR/Council web page: www.azwater.gov/gwaicc

Meeting information link: <https://new.azwater.gov/gwaicc/meetings>